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A new species of *Entoloma* from Liaoning Province, Northeast China

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Abstract —*Entoloma liaoningense,* a new species from Northeast China, is described, illustrated, and discussed. It is characterized by mycenoid to marasmioid basidiomata, conspicuously sulcate pileus, 2-spored basidia, isodiametric to subisodiametric basidiospores, and absence of both cystidia and clamp connections.

Key words — *Agaricales, Basidiomycota, Entolomataceae*, taxonomy

Introduction

Entoloma (Fr.) P. Kumm. (*Entolomataceae, Agaricales, Basidiomycota*) is a large genus that is widely distributed from tropic to temperate regions. Representatives of this genus are distinguished by their basidiospores that appear angular in all views. The genus has been extensively studied in Europe, North America, Africa, Indomalaya, and Australasia (Hesler 1967; Horak 1980, 2008; Gates & Noordeloos 2007; Largent 1994; Noordeloos 1992, 2004; Noordeloos & Gates 2009; Romagnesi & Gilles 1979).

During a preliminary study on the entolomataceous mycota in Liaoning Province, China, five specimens of an *Entoloma* species were collected from Benxi Laotudingzi Nature Reserve, which proved to represent a new species. It is formally described and discussed here.

Materials & methods

Specimens were collected from Laotudingzi Nature Reserve located in east Liaoning Province of Northeast China, at 41°16′38″–41°21′10″N 124°49′06″–124°57′08″E at an altitude of 600–1367 m. Fresh collections were photographed. Macro-morphological

descriptions are based on field notes and photos. Color notations are according to Kornerup & Wanscher (1978). Micro-morphological data were obtained from dried material examined under a light microscope. Basidiospores, basidia, pileipellis, and stipitipellis were observed in 5% KOH or 1% Congo Red, and KOH-soluble pigments were determined in distilled water mountants. All measurements were made in 5% KOH. For basidiospore dimensions, Q = "length/width ratio" of a basidiospore in side view, Q_m = average Q ± standard deviation. Basidiospore dimensions exclude the hilar appendix. The studied specimens are deposited in the Herbarium of Jilin Agricultural University (HMJAU).

Taxonomy

Entoloma liaoningense Yu Li, L.L. Qi & Xiao Lan He, **sp. nov.** Figs 1–2

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Differs from *Entoloma sericeum* by its smaller basidiomata, its bisporic basidia, and its habitat.

Type: China. Liaoning Province, Benxi, Laotudingzi National Nature Reserve, 12 September 2010, Qi Liang-Liang 5589 (HMJAU 23636, **Holotype**).

Etymology: *liaoningense* refers to Liaoning province, the collection location of the holotype.

Basidiomata mycenoid to marasmioid. Pileus 10–15 mm broad, plano-convex to hemispherical, slightly depressed at center, usually with a small papilla in the depression, more applanate to umbilicate in older ones, smooth, radially sulcate almost to the center, yellowish grey to pale brownish grey (3A2–3B2, 5B3), paler towards margin, slightly darker in the grooves, somewhat pale brown at the disc, dry, hygrophanous, sometimes zonate with one or two zones when mature. Lamellae sinuate to adnate, with short decurrent tooth, ventricose, moderately distant, thin, 1–3 mm broad, whitish grey, becoming somewhat pale pinkish with age, with concolorous and somewhat eroded edge; with lamellulae in two tiers. Stipe central, 35–45 × 1–2.5 mm, cylindrical, equal, pale brown, concolorous with the pileus center, hollow, glabrous, smooth, polished, dry, often with white tomentum at base. Context greyish white, very thin. Odor and taste not distinctive.

Basidiospores 8.0–10.5 × 7.0–8.5 μm, 5–6-angled in side-view, Q=1.0–1.25 (Q_m=1.15±0.03), isodiametric to subisodiametric, thick-walled. Basidia clavate, 25–37 × 8–12 μm, 2-spored, sometimes 1-spored; base clampless. Lamella edge fertile. Cheilocystidia and pleurocystidia absent. Lamella trama subparallel, composed of cylindrical, 8–18 μm wide, slightly encrusted elements. Pileipellis a cutis of repent hyphae; terminal elements cylindrical to narrowly clavate, 5–11 μm in diam, with pale brownish internally encrusting and intracellular pigment; subpellis composed of yellow brown, cylindrical elements, 6–13 μm in diam. Stipitipellis a cutis of cylindrical hyphae, 5–15

Fig. 1. *Entoloma liaoningense* (holotype HMJAU 23636): basidiomata.

μm wide, with pale brown, intracellular and encrusting pigment. Brilliant granules absent. Oleiferous hyphae rare. Clamp connections absent in all tissues.

Habitat: Scattered or solitary on soil among pine needles in mixed forests with *Pinus koraiensis* and *Quercus mongolica* or in coniferous forests with *Pinus koraiensis*.

Additional specimens examined: **China. Liaoning Province**, Benxi, Laotudingzi National Nature Reserve, 13 September 2010, Qi Liang-Liang 5659 (HMJAU 23637); 14 September 2010, Qi Liang-Liang 6076 (HMJAU 23638); Qi Liang-Liang 6144 (HMJAU 23639); Qi Liang-Liang 6176 (HMJAU 23640).

Commentary: The combination of characters such as the mycenoid to marasmioid habit, radially sulcate and pale brownish pileus surface, bisporic basidia, and isodiametric to subisodiametric basidiospores is diagnostic for *E. liaoningense*. Its mycenoid habit, absence of clamp-connections, and basidiospores that are never cuboid or cruciform, place it in subg. *Nolanea,* where it may be placed in sect. *Papillata* based on the absence of cystidia and presence of both incrusting and intracellular pigments.

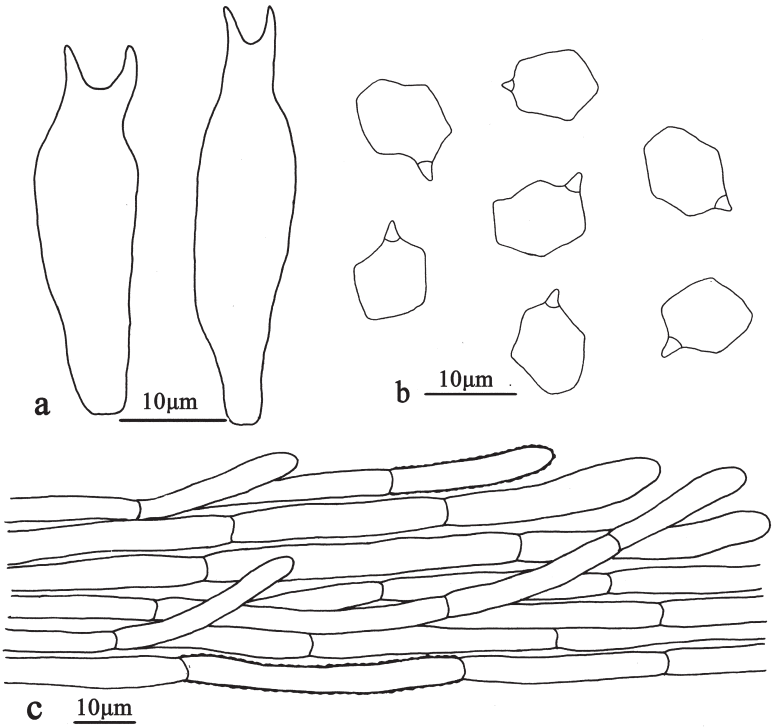

Fig. 2. *Entoloma liaoningense* (holotype): a. Basidia; b. Basidiospores; c. Pileipellis.

The basidioma stature, the pale brownish grey pileus, and the 2-spored basidia reminds one of the Japanese species *Entoloma bisporum* (Hongo) Hongo (Hongo 1957, as *Rhodophyllus bisporus*). However, *E. bisporum* can be easily distinguished by the more heterodiametric (8.5–9.5(–10) × (5.5–)6–6.5(–7) μm) basidiospores. In addition, the ecology of the two species also differs, with *E. bisporum* always occurring among mosses, while *E. liaoningense* is found on soil among pine needles.

Two other bisporic species described recently from China — *E. mastoideum* T.H. Li & Xiao Lan He and *E. praegracile* Xiao Lan He & T.H. Li (He et al. 2011) — also differ from *E. liaoningense*. *Entoloma mastoideum* can be easily distinguished by the pinkish to flesh-colored pileus, cylindrical to narrowly clavate cheilocystidia, and larger basidiospores (9.5–12(–13) × 7–8(–8.8) μm). *Entoloma praegracile* can be differentiated by the wax-yellowish to pale orange-yellow pileus and stipe and the heterodiametric basidiospores ((8–)9–10.5 × 6.5–8(–8.5) μm). The European *E. bisporigerum* (P.D. Orton) Noordel.

also has a brownish pileus and bisporic basidia but is separated by the larger basidiospores (10–12(–13) × (7.0–)8.0–9.5(–10.5) µm) and the presence of abundant clamp connections in all tissues (Noordeloos 1992).

The macro- and microscopic characters of *E. liaoningense* are somewhat similar to those of *E. sericeum* Quél.; nevertheless, *E. sericeum* can be separated by larger basidiomata (pileus 2–7 cm broad), tetrasporic basidia, and occurrence in grasslands or meadows (Noordeloos 1992).

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